Making basemaps for simulations of Wildland Fire with ALOS-AVNIR2

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Abstract

In this paper, we will grasp the latest vegetation and landuse situation from the data sensed by ALOS, and we are planning to make new Basemaps in which the data of latest vegetation and landuse are superimposed on the data of latest altitude (from SRTM image data), features and stream lines, and we get aspect and slope data by analyzing altitude. From this Basemaps we can perceive detailed situations of land surface, and then this is very important on simulation or forecast of Wildland Fire.

We study the research area in the middle southern district (from Palangka Raya to Banjarmasin) of Kalimantan, Indonesia, because there are many data accumulation of the Wildland Fire forecast in "Sentinel Asia Project" and field surveys are conducted. As a result we can contribute to the research project.

From this approach, we will clarify the present conditions and the actual situation of forest fire or peat fire in this area, and apply these results to simulation of Wildland Fire.

Keywords: Land Cover, Basemap, Wildland Fire

1. INTRODUCTION

A massive Wildland Fires occurred on the periphery of Palangka Raya in 1997 and 1998. Wildland Fire like these engenders smoke pollutions, damages ecosystems and ejects greenhouse gases (CO2 or Methane Gas, etc). Then, we must evaluate and avoid the danger of Wildland Fires with simulation or forecast about Wildland Fire.

In this purpose, we need Basemaps consisted of altitude data, land features data, stream line map, landuse map (Vegetation), etc.

In our study, however, Basemaps are dependent on 1990's data mainly now. We must have updated the data in the research area in this decade. If we can not use new data, we can not get the credible result of simulation or forecast because of old data. Therefore, we need latest data for grasping the current and correct situations of the research area. And also, we are planning to use new satellite's data, for example ALOS/AVNIR-2 Data.

In this paper, we make new basic database on which hotspot data are superimposed.

2. RESEARCH AREA

Figure 1. Central Kalimantan, Indonesia
2 ° S ~ 3 ° 30' S, 113 ° 12' E~ 115 ° E

We choose the research area shown in Fig. 1 because there are many accumulated data of the Wildland Fire simulation or forecast in "Sentinel Asia Project". That is a reason why in these days research institutes in many countries pay a lot attention to study on Wildland Fire about this area, and we have also conducted field survey since 2005.

3. EFFECTIVENESS OF NEW DATA

Firstly, we compute a data value of NDVI (Normalized Difference Vegetation Index) from AVNIR-2 data source about research area for seeing the land cover situation (Fig. 2). The color bar of NDVI analysis data means that the white is high vegetation index value, and the black is low. Therefore we can estimate the bright area at the abundant vegetation in Fig. 2, and the dark area at poor vegetation.

Secondly, we compare the analyzed results with the NDVI analysis data from TM-LANDSAT7 (GLCF) in 1998/03/28, AVNIR-2 (JAXA) in 2006/12/20 and AVNIR-2 in 2007/05/07 as shown in Fig. 3. From this figure, the vegetation has changed significantly in this decade, and has been changing year by year.

As a result, it is found that update to latest data is effective for understanding the current situations of land cover and getting more correct results from simulations or forecast using these latest data sources.

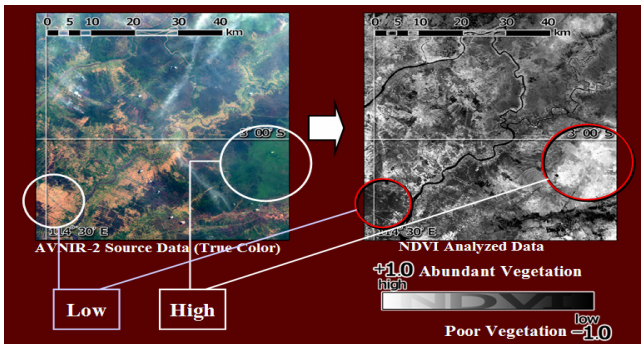

Figure 2. NDVI analysis

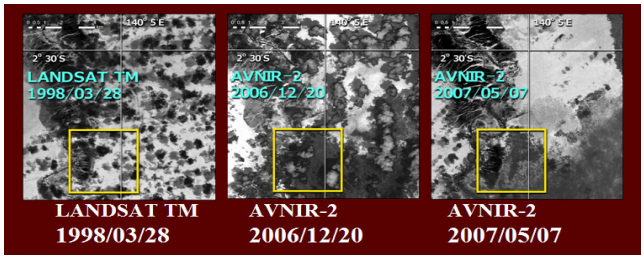

Figure 3. Comparison with past data

4. NEW BASEMAPS

We need many factors on simulation or forecast of Wildland Fire. For example, altitude data, land features data, stream line map, landuse map (Vegetation), etc. Then, it is ideal if these multiple data are managed in an integrated database.

For this purpose we input these multiple data into GIS System, and make the accessibility to these data easy. In this system, we can make maps as a Basemap with many factor layered.

The data sources include the data of land features (road, building etc.), SRTM Data (altitude, slope, aspect), ALOS Data (land cover situations), other satellites' data (backup for other data), etc (stream lines, etc).

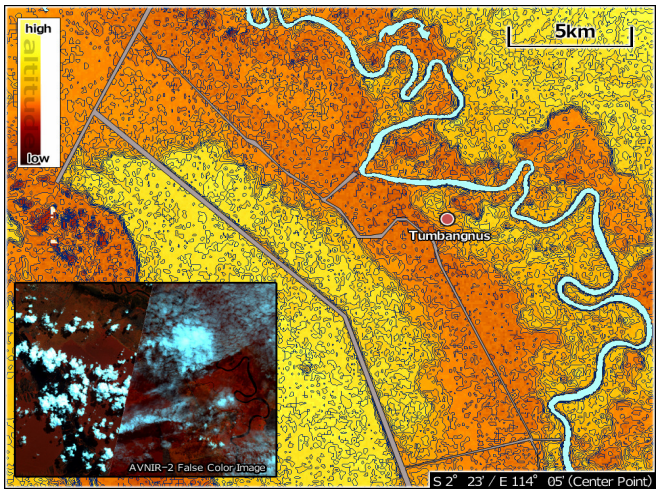

Figure 4. new Basemap sample

In Fig. 4 we show a sample Basemap about South East of Palangka Raya City. This Basemap consists of stream lines, ground feature (road), contour line and altitude gradation. And the image on the bottom-left is false color image from AVNIR-2 data. We combine these data to make clear the situation in this field.

5. PROBLEMS AND FURTHER STUDY

There are many cloudy days in the observational period by ALOS, and we can not get complete data source for analysis. Then, we must complete the insufficient data of AVNIR2 by other data sources. For example, ALOS/PALSAR (Phased Array type L-band Synthetic Aperture Radar) or other satellite data (LANDSAT etc) are used for it.

The results from NDVI analysis are only computer estimation, so that we must do a crosscheck on the analyzed data with ground truth data from field surveys in order to make more detail correct database of land-cover.

At present we are planning to superimpose the Hotspot Data or Precipitation Data on the new Basemaps, and to analyze the situation of Wildland Fires in the research area as shown in Fig. 5.

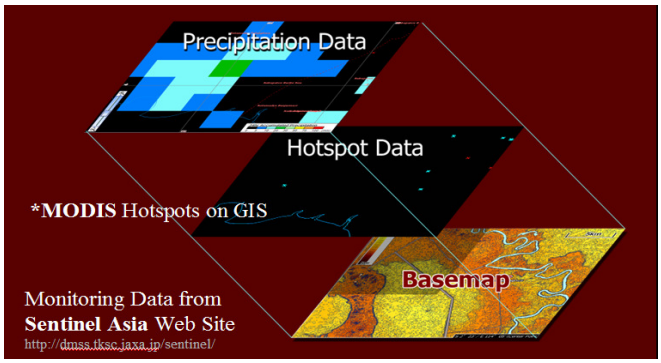

Figure 5. Example of use

Acknowledgement

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